

WORKSHEET

Class XI

Name :

Date: 13.9.13

Q1 Prove by the principle of mathematical induction, that for all $n \in \mathbb{N}$

- a) $1+4+7+\dots+(3n-2) = (n(3n-1))/2$
- b) $1^3+2^3+3^3+\dots+n^3 = (n(n+1)/2)^2$
- c) $1 + 1/(1+2) + 1/(1+2+3) + \dots + 1/(1+2+3+\dots+n) = 2n/(n+1)$, for all $n \in \mathbb{N}$
- d) $1/(1.3) + 1/(3.5) + 1/(5.7) + \dots + 1/((2n-1)(2n+1)) = n/(2n+1)$
- e) $7^n - 3^n$ is divisible by 4.
- f) $(1+x)^n \geq 1+nx$ whenever x is +ve and n is a +ve integer.
- g) $4^n + 15n - 1$ is divisible by 9, for $n \in \mathbb{N}$.

Q2. Prove that $(\cos 8A \cos 5A - \cos 12A \cos 9A) / (\sin 8A \cos 5A + \cos 12A \sin 9A) = \tan 4A$.

Q3. Prove that $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$

Q4. If $A = \{1, 2, 5\}$, $B = \{1, 2, 3, 4\}$ and $C = \{5, 6, 2\}$, Verify that

a) $A \Delta (B \cap C) = (A \Delta B) \cap (A \Delta C)$

b) $(A - B) \Delta C = (A \Delta C) - (B \Delta C)$

Q6. What is the value of $\cos(\pi/4 - x) \cos(\pi/4 - y) - \sin(\pi/4 - x) \sin(\pi/4 - y)$

Q7. What is the eccentricity of the curve $4x^2 + y^2 = 100$.

Q8. What is the value of $\cot((-15\pi)/4)$

Q9. Find $\sin x/2$, $\cos x/2$ and $\tan x/2$ if $\tan x = -4/3$, x in quadrant II

Q10. Find the square root of $-7 - 24i$

Q11. Prove that $\cos^2 x + \cos^2(x+\pi/3) + \cos^2(x-\pi/3) = 3/2$

Q12. Show that $(A \cup B)' = A' \cap B'$ and $(A \cap B)' = A' \cup B'$

Where $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$, $A = \{2, 3, 4\}$ and $B = \{3, 4, 5\}$